

Sound System With Dedicated Vocal Channel

Field of the Invention

The present invention relates in general to karaoke,
5 public address and audio systems and in particular to a
karaoke system with a dedicated vocal channel.

Background of the Invention

A conventional karaoke system plays a requested pre-
10 recorded song that is mixed with a vocal performance of a
singer. Typically, lyrics of the requested song are
displayed on a monitor to aid the singer to sing along. A
set of instrumental songs are played through the Karaoke
system for the singer to sing along with.

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Such a conventional karaoke system comprises: (1) a
mixer that combines the singer's real-time voice signal
from a microphone with the pre-recorded background
song/music signal from a player, (2) an amplifier that
20 receives the mixed signal from the mixer to provide
amplification or gain boosting, and (3) one or more
speakers to output the mixed and amplified audio signal.
For stereo output two speakers are used and for mono output
one speaker is used.

However, though this configuration works for many standard audio applications, because the vocal and music signals are pre-mixed into one signal for speaker output, the vocals tend to lack definition. Further, the vocals have to compete with the music for sound space, thereby often sounding muddy, far away and without direction.

There is, therefore, a need for a sound system that provides an additional channel dedicated to microphone output along with the conventional output of pre-mixed music and microphone output. There is also a need for such a system to allow the microphone output to be heard clearly with directional presence, without having to compete with the pre-mixed music for sound space.

Brief Summary of the Invention

The present invention addresses the above needs. In one embodiment the present invention provides a sound system comprising: a mixer that combines the singer's real-time voice signal from a microphone with the pre-recorded background song/music signal from a player, an amplifier that receives the mixed signal from the mixer to provide amplification or gain boosting, a dedicated channel for the

vocal signal from the microphone without using a mixing device, a dedicated amplifier that receives the vocal signal to provide amplification or gain boosting, and one or more speakers to output the vocal signal from the
5 dedicated channel. The vocal channel allows the vocals to maintain an overall cleaner and vibrant sound, with a "live feeling" positional presence without the need for multiple mixers, amplifier and/or speaker combinations.

10 In another embodiment, the present invention provides a sound system comprising: a mixer that combines the singer's real-time voice signal from a microphone with the pre-recorded background song/music signal from a player, an amplifier that receives the mixed signal from the mixer to
15 provide amplification or gain boosting, one or more speakers to output the mixed and amplified audio signal, a dedicated channel for the vocal signal from the microphone without using a mixing device, and an optional synchronizer circuit that allows synchronization or feedback control
20 between the amplifier and the dedicated voice channel.

Such embodiments of sound systems according to the present invention improves the overall sound quality and vocal presence in karaoke sound systems including karaoke

boom boxes, karaoke mixers, karaoke mixing amplifiers,
karaoke players, etc.

These and other features, aspects and advantages of
5 the present invention will become understood with reference
to the accompanying drawings, and the following
description, appended claims.

Brief Description of the Drawings

10 Fig. 1 shows a block diagram of a conventional karaoke
system wherein music and vocals are pre-mixed into one
signal for speaker output;

Fig. 2A shows an example functional block diagram of
15 an embodiment of a sound system having a dedicated vocal
channel according to the present invention;

Fig. 2B shows an example functional block diagram of
another embodiment of a sound system having a dedicated
20 vocal channel with a synchronization circuit according to
the present invention;

Fig. 3A shows an example diagram of a conventional
P.A./karaoke/DJ Setup sound system;

Fig. 3B shows an example diagram of a P.A./karaoke/DJ Setup sound system having a dedicated vocal channel according to an embodiment of the present invention;

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Fig. 4A shows an example diagram of a conventional karaoke mixer or mixing amplifier;

Fig. 4B shows an example diagram of a karaoke mixer or mixing amplifier sound system having a dedicated vocal channel according to an embodiment of the present invention;

Fig. 5A shows an example diagram of a conventional karaoke system;

Fig. 5B shows an example diagram of a karaoke sound system having a dedicated vocal channel according to an embodiment of the present invention;

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Fig. 6 shows an example block diagram of another example sound system according to the present invention, including two or more dedicated vocal channels; and

Fig. 7 shows an example block diagram of another example sound system according to the present invention, wherein two microphones provide vocal signals to a dedicated vocal channel.

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Detailed Description of the Invention

Fig. 1 shows a block diagram of a conventional karaoke sound system 100 wherein music and vocals by a user 110 are pre-mixed into one signal for speaker output. As noted
10 above, such a convention karaoke sound system 100 comprises: a mixer 125 that combines the singer's real-time voice signal from a microphone 130 with the pre-recorded background song/music signal from a player 140 (e.g., CD player); an amplifier 150 that receives the mixed signal
15 from the mixer 125 to provide amplification or gain boosting; and one or more speakers 160 to output the mixed and amplified audio signal. As shown, for stereo output two speakers 160 are used and for mono output one speaker 160 can be used.

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In this configuration, because the vocal and music signals are pre-mixed into one signal for speaker output, the vocals tend to lack definition. Further, the vocals

have to compete with the music for sound space, thereby sounding muddy, far away and without direction.

Fig. 2A shows an example functional block diagram of an embodiment of a sound system 200 according to the present invention which addresses the above problems. The sound system 200 comprises: (1) a mixer 120 that combines the singer's real-time voice signal from a microphone 130 via an input device 135, with the pre-recorded background song/music signal from a player 140, (2) an amplifier 150 that receives the mixed signal from the mixer 120 to provide amplification or gain boosting, (3) one or more speakers 160 to output the mixed and amplified audio signal, and (4) a dedicated channel 220 for the vocal signal from the microphone 130 without using a mixing device.

In this embodiment, the dedicated vocal channel 210 comprises an amplifier 220, a controller 230 (e.g. volume control, gain control, bass control, treble control, surround sound control, etc.) and one or more speakers 240 to output the amplified and controller vocal signal. In another example, the controller 230 can be a component of the amplifier 220. The dedicated vocal channel 210 allows

the vocals to maintain an overall cleaner and vibrant sound, with a "live feeling" positional presence without the need for multiple mixer, amplifier and/or speaker combinations.

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Fig. 2B shows an example functional block diagram of another embodiment of a sound system 250 according to the present invention which is a variation of the sound system 200 in Fig. 2A. The sound system 250 in Fig. 2B comprises:

- 10 (1) a mixer 120 that combines the singer's real-time voice signal from a microphone 130 via an input device 135, with the pre-recorded background song/music signal from a player 140, (2) an amplifier 150 that receives the mixed signal from the mixer 120 to provide amplification or gain
- 15 boosting, (3) one or more speakers 160 to output the mixed and amplified audio signal, (4) a dedicated channel 210 for the vocal signal from the microphone 130 without using a mixing device, and (5) an optional synchronizer circuit 260 that allows synchronization or feedback, suppression and/or
- 20 control functions between the amplifier 150 and the dedicated voice channel 210.

For example, the synchronizer circuit 260 may comprise a sensor or feedback signal that provides automatic

gain/volume control for the vocal channel 210 depending on the gain/volume of the sound from the pre-mixed speakers 160. In that case, the mixer 120, the amplifier 150 and the speaker 160 form a main channel that is in feedback control configuration with the vocal channel 210 via the circuit 260. As those skilled in the art recognize, the synchronizer circuit 260 may provide other functions as desired.

10 Further, the present invention can be implemented in various sound systems to improve the vocal signal output in such systems. A few examples of such sound systems are described below, however, those skilled in the art will recognize that the present invention is useful with other sound systems as well.

In one example, Fig. 3A shows a conventional public address (P.A)/karaoke/disc jockey (DJ) sound system configuration 300. Such a conventional system 300 provides only mono or stereo output of sound. When microphone output is included for vocals, the microphone voice signal is pre-mixed with music signals in the same mono/stereo configuration, before output from speakers 310.

This pre-mixing of music and microphone signals tends to cause loss of directional sound presence and vocal clarity. In a stereo configuration, each of two speakers 310 outputs pre-mixed music and microphone signal resulting
5 in muddy vocals with lack of direction.

Fig. 3B shows an improved P.A./Karaoke/DJ sound system configuration 350, which comprises the conventional system 300 (Fig. 3A) and a dedicated voice channel 355, according
10 to an embodiment of the present invention.

The dedicated voice channel 355 (e.g., channel 210 in FIG. 2A) provides an additional channel dedicated to microphone output to a vocal speaker 360 along with the
15 traditional mono/stereo output of pre-mixed music and microphone output from speaker 310. This allows the microphone output to be heard clearly with directional presence, wherein the vocals do not compete with the music or audio for sound space.

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The dedicated vocal channel 355 can be controlled by a user with a channel level control 365 (e.g., volume control, gain control, bass control, treble control, surround sound control, etc. in Fig. 2A), providing

superior balancing control and overall improved sound quality.

As such, the left and right speakers 310 output pre-
5 mixed music and microphone signal, and the dedicated vocal
speaker 360 outputs clear, vibrant vocals with controllable
volume and direction. The channel level control 365 for
the vocal speaker 360 allows precise balancing and
direction of microphone signal output via the vocal speaker
10 360.

In another example, Fig. 4A shows a conventional
karaoke mixer or mixing amplifier 400, which provide mono
or stereo sound output from speakers 410. When microphone
15 output is included for vocals, the microphone output signal
is pre-mixed with music or audio in the same mono/stereo
configuration before output from speakers 410.

Therefore, this pre-mixing of music and microphone
20 signals tends to cause the loss of directional sound
presence and vocal clarity. In a stereo configuration,
each of two speakers 410 outputs pre-mixed music and
microphone signal resulting in muddy vocals with lack of
direction.

Fig. 4B shows an improved Karaoke Mixer or Mixing Amplifier 450, which includes the system 400 of FIG. 4A and a dedicated voice channel 455, according to an embodiment
5 the present invention. The dedicated voice channel 455 (e.g., channel 210, FIG. 2A) provides an additional channel dedicated to microphone output along with the traditional mono/stereo output of pre-mixed music and microphone output. This allows the microphone output to a
10 vocal speaker 460 be heard clearly with directional presence, wherein the vocals do not compete with the music or audio for sound space.

The dedicated vocal channel 455 can be controlled by a
15 user with a channel level control 465, providing superior balancing control and overall improved sound quality. As such, the left and right speakers 410 output pre-mixed music and microphone signal, and the dedicated vocal speaker 460 outputs clear, vibrant vocals with controllable
20 volume and direction. The channel level control 465 for the vocal speaker 460 allows precise balancing and direction of microphone signal output via the vocal speaker 460.

Yet in another example, FIG. 5A shows a conventional karaoke system 500, which provides mono or stereo sound output from speakers 510. When microphone output is included for vocals, the microphone output signal is pre-mixed with music or audio in the same mono/stereo configuration before output from speakers 510.

Therefore, this pre-mixing of music and microphone signals tends to cause the loss of directional sound presence and vocal clarity. In a stereo configuration, each of two speakers 510 outputs pre-mixed music and microphone signal resulting in muddy vocals with lack of direction.

Fig. 5B shows an improved karaoke system 550, which includes the conventional system 500 and a dedicated voice channel 555, according to an embodiment of the present invention. The dedicated voice channel 555 (e.g. channel 210, FIG. 2A) provides an additional channel dedicated to microphone output from a vocal speaker 560 along with the traditional mono/stereo output of pre-mixed music and microphone output from the speakers 510. This allows the microphone output to be heard clearly from the vocal speaker 560 with directional presence, wherein the vocals

do not have to compete with the music or audio for sound space.

5 The dedicated vocal channel 555 can be controlled by a user with a channel level control 565, providing superior balancing control and overall improved sound quality for vocal output from the speaker 560. As such, the left and right speakers 510 output pre-mixed music and microphone signal, and the dedicated vocal speaker 560 outputs clear, 10 vibrant vocals with controllable volume and direction. The channel level control 565 for the vocal speaker allows precise balancing and direction of microphone signal output via the vocal speaker 560.

15 The present invention can be implemented in other sound systems to improve the vocal signal output in such systems. Those skilled in the art will recognize that the present invention is useful with other sound systems in addition to those described herein by example.

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 Further, many alterations and modifications may be made by those skilled in the art without departing from the spirit and scope of the invention. For example, another sound system 600 according to the present invention, shown

by the example block diagram in FIG. 6, includes two or more dedicated vocal channels 210, each vocal channel receiving input from a microphone 130 via an input device 135. Further, each dedicated vocal channel 210 can be
5 stereo and include two or more speakers.

Yet in another example embodiment according to the present invention, a sound system 700 shown in FIG. 7 includes a vocal channel 210 that can receive vocal signal
10 inputs from two or more microphones 130 via input devices 135. In that case, the vocal channel 210 may include a mixer 225 to mix the input signals. Further, the dedicated vocal channel 210 can be connected to another signal source instead of, or in addition to, the microphone shown in the
15 examples herein.

Therefore, it must be understood that the illustrated embodiment has been set forth only for purposes of example and that it should not be taken as limiting the invention
20 as defined by the following claims. The words used in this specification to describe the invention and its various embodiments are to be understood not only in the sense of their commonly defined meanings, but to include by special definition in this specification structure, material or

acts beyond the defined meanings. Thus if an element can be understood in the context of this specification as including more than one meaning, then its use in a claim must be understood as being generic to all possible
5 meanings supported by the specification and by the words itself.

The definitions of the words or elements of the following claims are therefore, defined in this
10 specification to include not only the combination of elements which are literally set forth, but all equivalent structure, material or acts for performing substantially the same function in substantially the same way to obtain substantially the same result. In this sense it is
15 therefore contemplated that an equivalent substitution of two or more elements may be made for any one of the elements in the claims below, or that a single element may be substituted for two or more elements in a claim.

20 Insubstantial changes from the claimed subject matter as viewed by a person with ordinary skill in the art, now known or later devised, are expressly contemplated as being equivalent within the scope of the claims. Therefore, obvious substitutions now or later known to one with

ordinary skill in the art are defined to be within the scope of the defined elements.

The claims are thus to be understood to include what
5 is specifically illustrated and described above, what is conceptually equivalent, what can be obviously substituted and also what essentially incorporates the essential idea of the invention.